

WHAT IS CLAIMED IS:

- Paul C.J.*
1. A method for fabricating a capacitor of a semiconductor device comprising:
    - depositing a conductive layer on a substrate;
    - forming a photoresist pattern on the conductive layer;
    - etching the conductive layer using the photoresist pattern as a mask to form a lower electrode;
    - removing the photoresist using an etching gas that is non-reactive with respect to the lower electrode; and
    - forming a dielectric film and an upper electrode on a surface of the lower electrode.
  2. The method of claim 1, wherein the upper and lower electrodes are one of Ru, RuO<sub>2</sub>, and a metal material alloyed with Ru.
  3. The method of claim 1, wherein the etching gas is one of H<sub>2</sub>O, NH<sub>3</sub>, and N<sub>2</sub>, a mixture of H<sub>2</sub> and O<sub>2</sub> in which an amount of H<sub>2</sub> is smaller than an amount of O<sub>2</sub>, a mixture of H<sub>2</sub>O, NH<sub>3</sub>, and N<sub>2</sub>, a mixture of N<sub>2</sub> and NH<sub>3</sub>, a mixture of NH<sub>3</sub> and H<sub>2</sub>O, and a mixture of N<sub>2</sub> and H<sub>2</sub>O.
  4. A method for fabricating a capacitor of a semiconductor device comprising:
    - forming a conductive region on a semiconductor substrate;
    - forming an interleaving insulating film having a contact hole therein over the conductive region;
    - forming a contact plug within the contact hole;
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forming insulating film patterns on of the interleaving insulating film to expose the contact plug and the interleaving insulating film adjacent to the contact plug;

depositing a barrier film and a first conductive layer on the contact plug and the insulating film patterns;

forming a photoresist over the contact plug between the insulating film patterns;  
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Sequentially removing the first conductive layer and the barrier film on the insulating film patterns using the photoresist as a mask, thereby forming a lower electrode and a barrier film in a U-shape in cross-section;

removing the photoresist using an etching gas that is non-reactive with respect to the lower electrode;

removing the insulating film patterns; and  
Sequentially forming a dielectric film and an upper electrode on the lower electrode and the barrier film.

5. The method of claim 4, wherein the lower electrode is one of Ru, RuO<sub>2</sub>, and a metal material alloyed with Ru.

6. The method of claim 4, wherein the etching gas is one of H<sub>2</sub>O, NH<sub>3</sub>, and N<sub>2</sub>, a mixture of H<sub>2</sub> and O<sub>2</sub>, in which an amount of H<sub>2</sub> is smaller than an amount of O<sub>2</sub>, a mixture of H<sub>2</sub>O, NH<sub>3</sub>, and N<sub>2</sub>, a mixture of N<sub>2</sub> and NH<sub>3</sub>, a mixture of NH<sub>3</sub> and H<sub>2</sub>O, or a mixture of N<sub>2</sub> and H<sub>2</sub>O is used as the etching gas.

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7. The method of claim 4, wherein the insulating film pattern comprises an oxide film.
8. The method of claim 4, wherein the insulating film pattern is formed by stacking two insulating films.
9. The method of claim 8, wherein the two insulating films are a nitride film and an oxide film.
10. The method of claim 4, wherein the barrier film is only formed on the contact plug within the contact hole.
- Abst 2/3/7*